

FIBER OPTIC PITCH OR ROLL SENSOR

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT (1) GREGORY H. AMES, citizen of the United States of America, employee of the United States Government, a resident of Wakefield, County of Washington, State of Rhode Island, have invented certain new and useful improvements entitled as set forth above of which the following is a specification.

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PATENT TRADEMARK OFFICE

1 Attorney Docket No. 78381

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3 FIBER OPTIC PITCH OR ROLL SENSOR

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5 STATEMENT OF GOVERNMENT INTEREST

6 The invention described herein may be manufactured and used
7 by or for the Government of the United States of America for
8 governmental purposes without the payment of royalties thereon
9 or therefore.

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CROSS REFERENCE TO OTHER PATENTS

This patent application is co-pending with two related
patent applications entitled MULTIPLEXED FIBER LASER SENSOR
SYSTEM (Attorney Docket No. 78371) and FIBER OPTIC CURVATURE
SENSOR FOR TOWED HYDROPHONE ARRAYS (Attorney Docket No. 78333),
by the same inventors as this application.

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18 BACKGROUND OF THE INVENTION

19 (1) Field of the Invention

20 This invention relates to a device for sensing the local
21 gravitational field so as to provide a roll or pitch sensor.
22 The device of the present invention, in combination with other
23 sensors, may be used to determine the shape of a towed
24 hydrophone array.

1 (2) Description of the Prior Art

2 Sensors which employ optical fibers to measure physical
3 motion of a structure are known in the prior art. For example,
4 U.S. Patent Nos. 4,788,868 to Wilk; 4,654,520 to Griffiths; and
5 4,812,645 to Griffiths illustrate structural monitoring systems
6 using fiber optics. U.S. Patent No. 4,806,012 to Meltz et al.
7 illustrates a distributed, spatially resolving optical fiber
8 strain gauge in which the core of the optical fiber is written
9 with periodic grating patterns effective for transmitting and
10 reflecting light injected into the core. Spectral shifts in the
11 transmitted and reflected light indicate the intensity of the
12 strain or temperature variations at positions of the grating
13 corresponding to the associated wavelengths of injected light.
14 U.S. Patent No. 5,012, 679 to Haefner illustrates an optical
15 sensor which uses a beam waveguide embedded in a force or
16 pressure transmitting material, in particular an elastomer. To
17 be used as a force measuring sensor, the bean waveguide is
18 mounted on an elastic deformable body and embedded in a material
19 that does not undergo creep under the influence of a force.
20 None of these sensors have utility as a roll or pitch sensor.

21 Some towed hydrophone arrays require precise determination
22 of their shape in the water. This has been done in the past
23 with gimbaled heading sensors. These devices are quite
24 expensive. It is desirable to reduce cost in the towed array.